

# DOE's Vehicle Technologies Office

Analysis



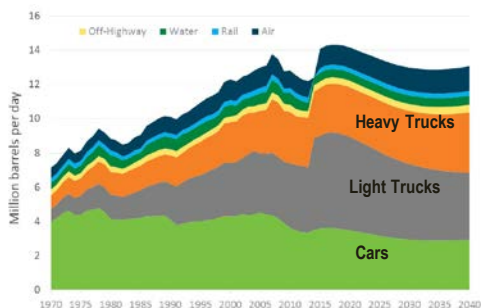
U.S. DEPARTMENT OF  
**ENERGY**

Energy Efficiency &  
Renewable Energy

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Technical Project Manager  
Office of Energy Efficiency and Renewable Energy

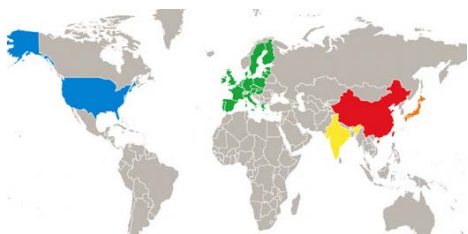
# U.S. Transportation & Energy Drivers

**70%** of total U.S. petroleum usage is for transportation



On-road vehicles account for **85%** of transportation petroleum usage

Transportation is the **2<sup>nd</sup>** most expensive spending category after housing



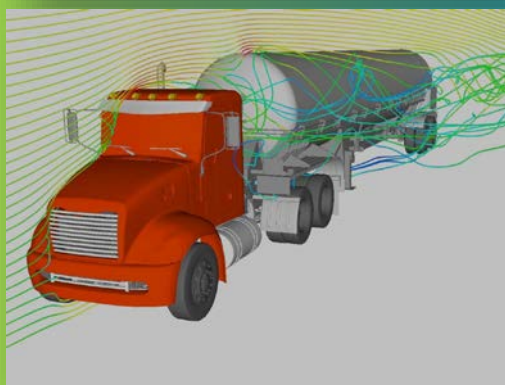
**75%** of cars & trucks are sold outside US - Innovation drives US global competitiveness and domestic supply base

## Key Questions and Direction for Analysis

- What R&D to invest in to improve efficiency, save consumers money, create economic growth, and protect human health
  - Track trends like VMT, vehicle ownership, fuel choices, and infrastructure
  - EV sales are growing, what are the infrastructure needs? How will EVs impact the grid? Does it save consumers money and improve human health?
  - Freight transportation is growing, how do we improve efficiency of moving goods we buy?
- What will the future look like if we meet all our subprogram targets? What if our subprograms fall short?



# Analysis Supports VTO Sub-programs

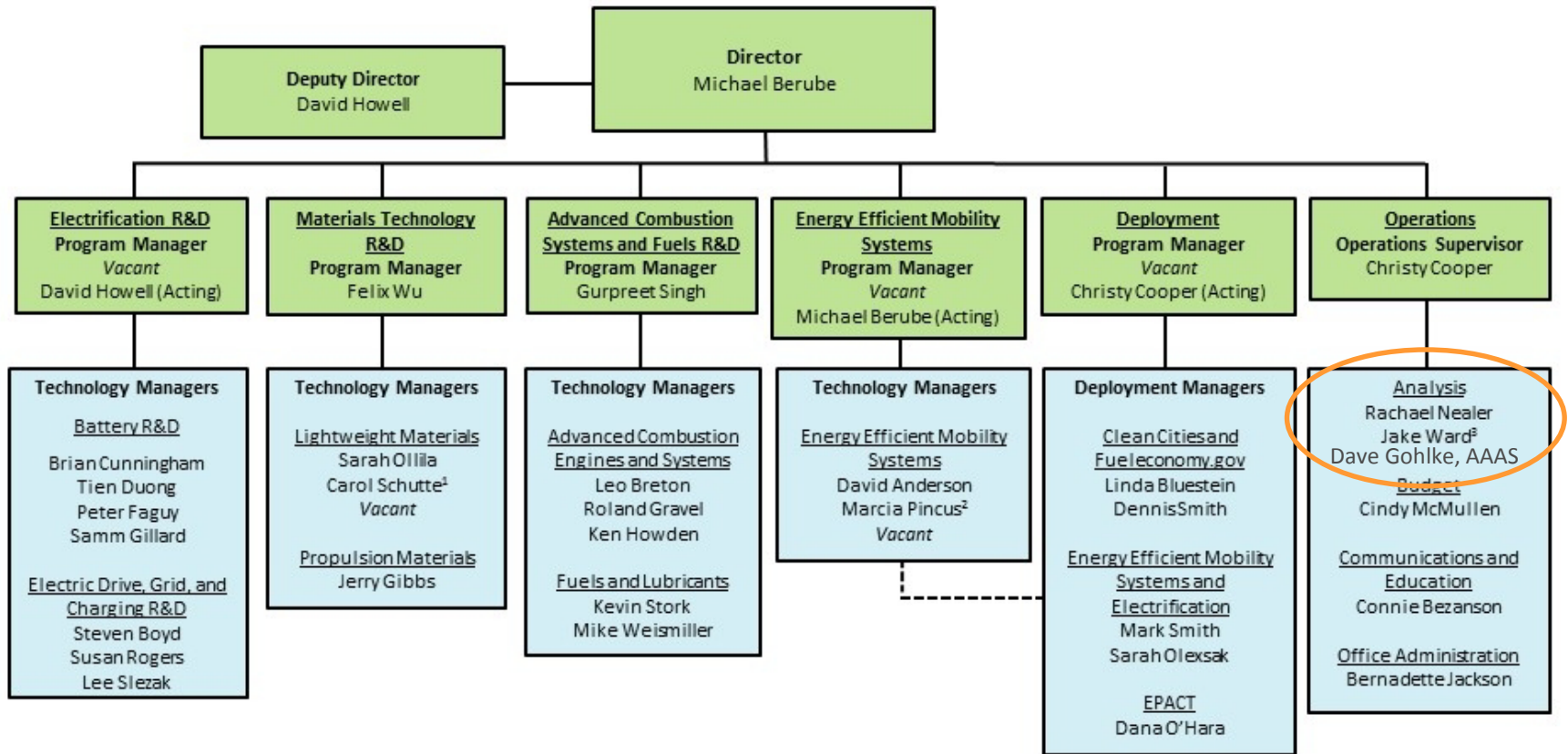


**Component**

**Vehicle**

**Transportation System**

# Vehicle Technologies Office



<sup>1</sup> Detailed to DOC/NTIS

<sup>2</sup> Detail from DOT/FHWA

<sup>3</sup> Part time status, based at NETL-Pittsburgh

January 2017

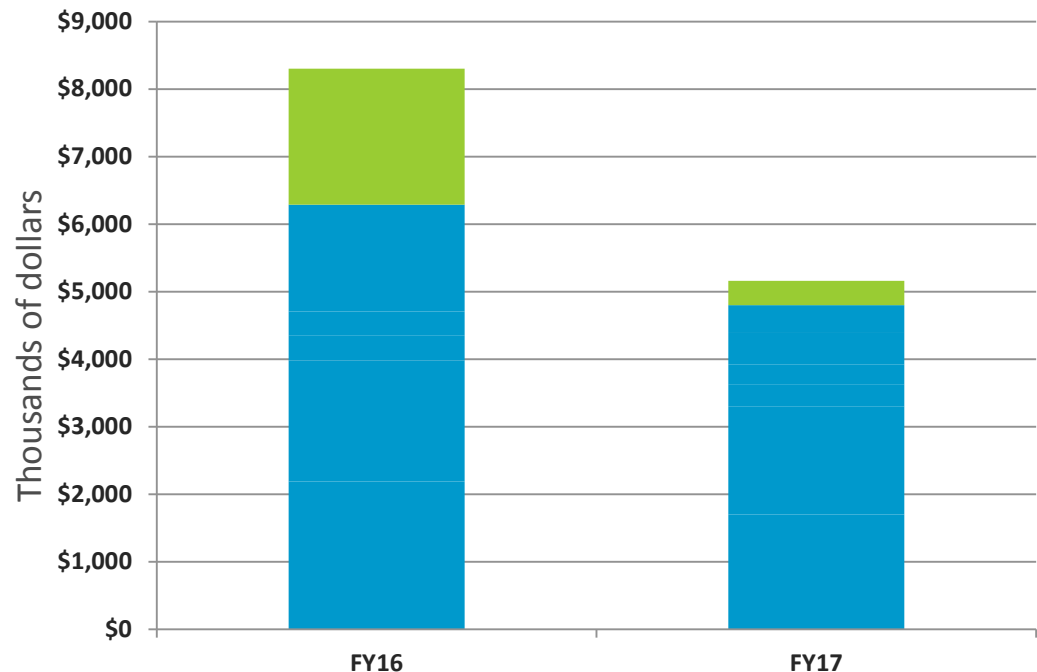
# VTO Analysis (VAN) Program Overview

## strategy

Create and maintain a strong foundation of data, build relevant analytical models, and execute insightful integrated analyses critical transportation energy problems

## budget

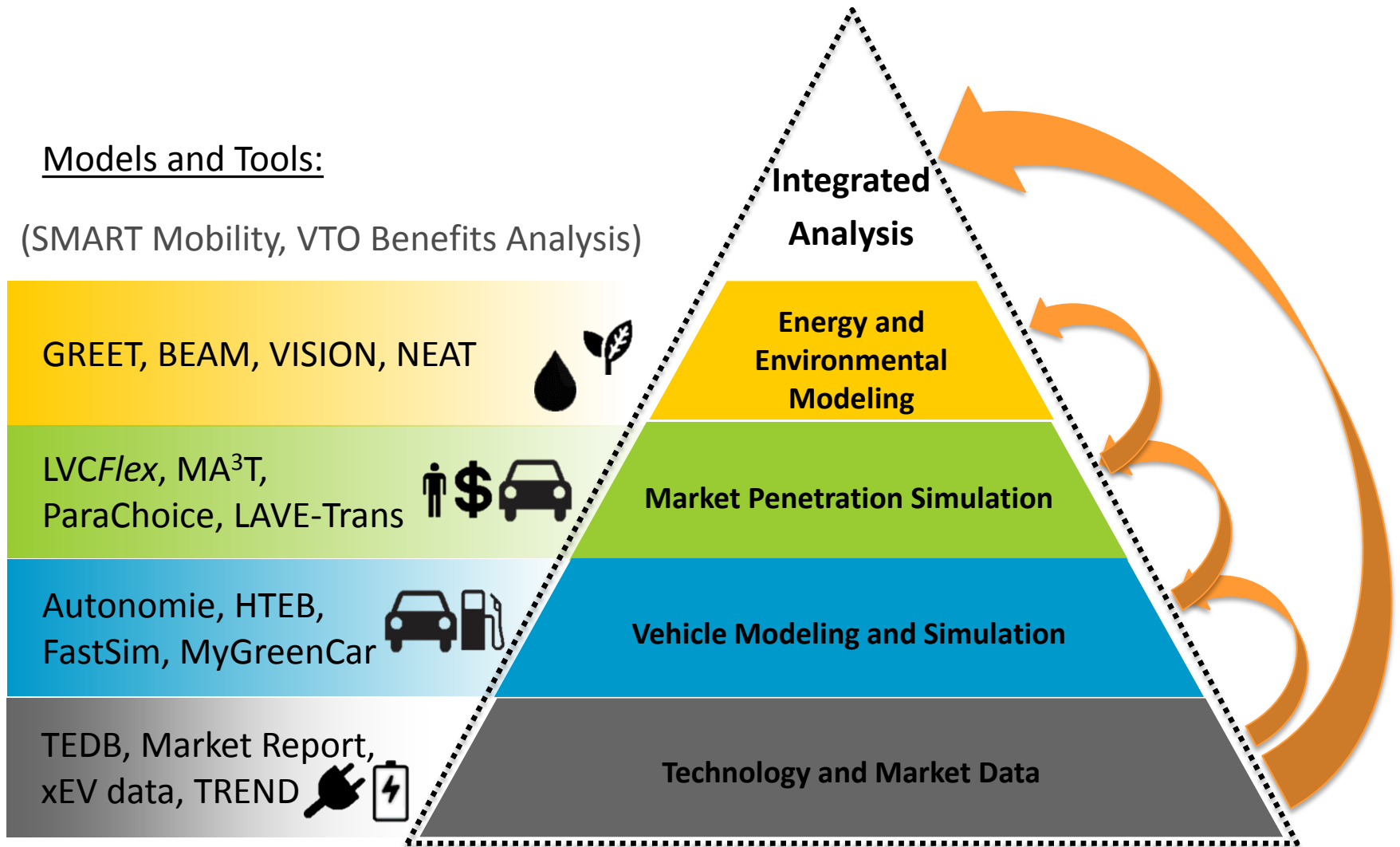
- FY16 budget restructure increased Analysis budget; lead to co-funding SMART mobility consortium
- FY17 enacted aligned with historical levels at just over \$5M
- National Laboratory support from ANL, ORNL, LBNL, NREL, and Sandia



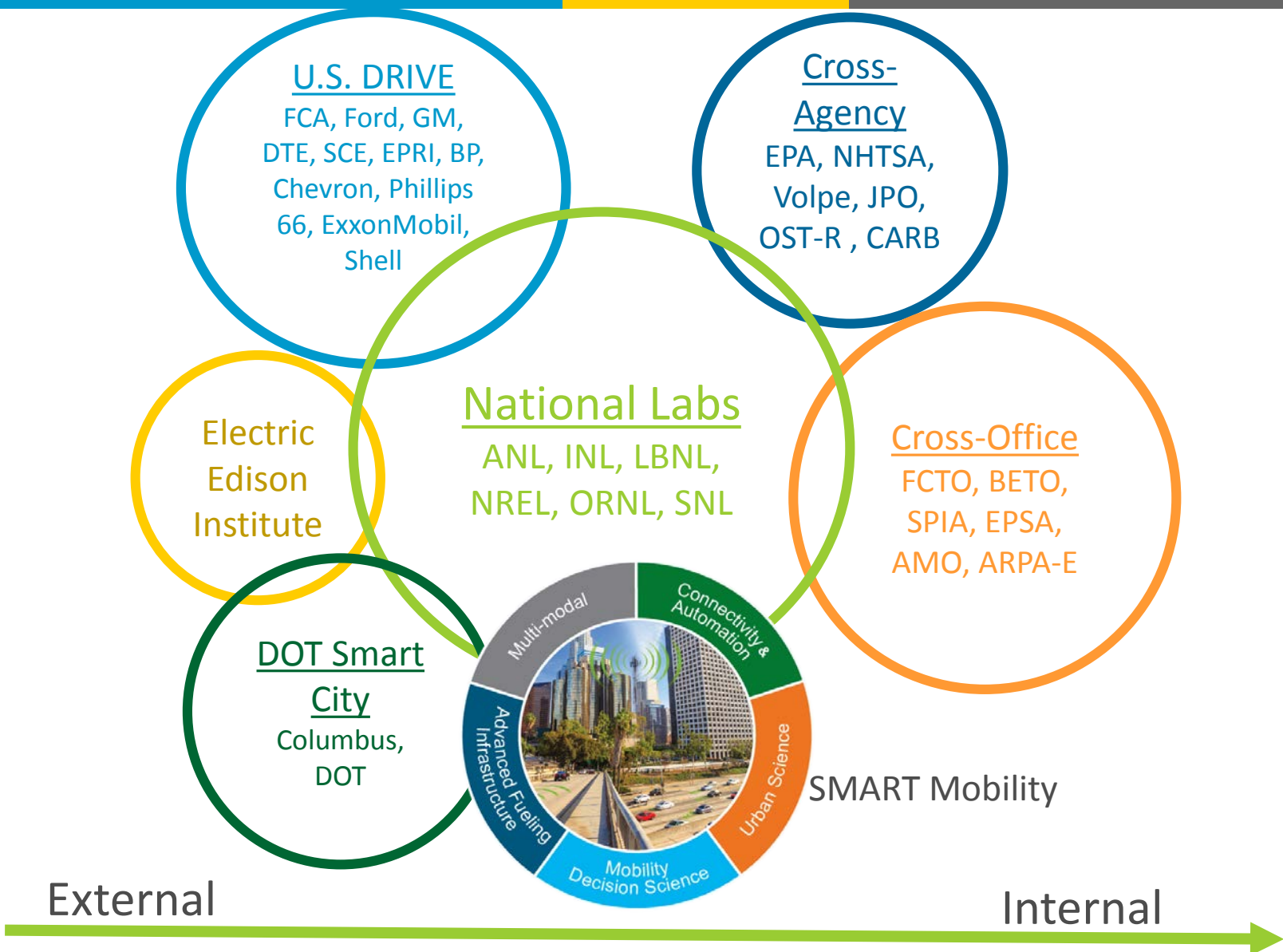
# VTO Analysis (VAN) Core Program at a Glance

## Models and Tools:

(SMART Mobility, VTO Benefits Analysis)

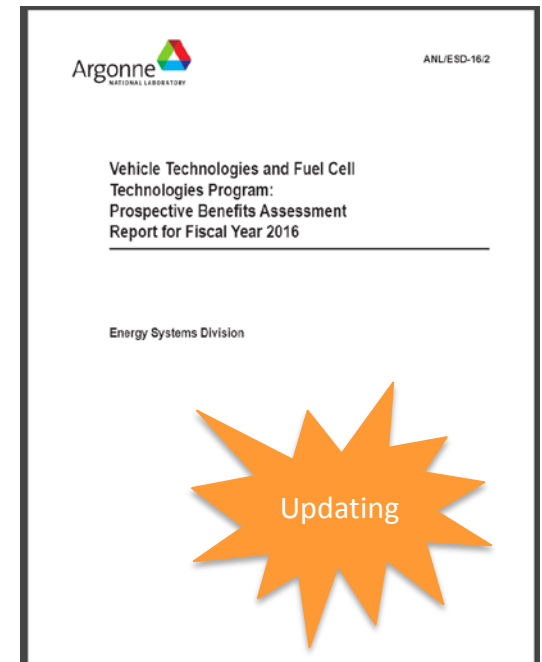
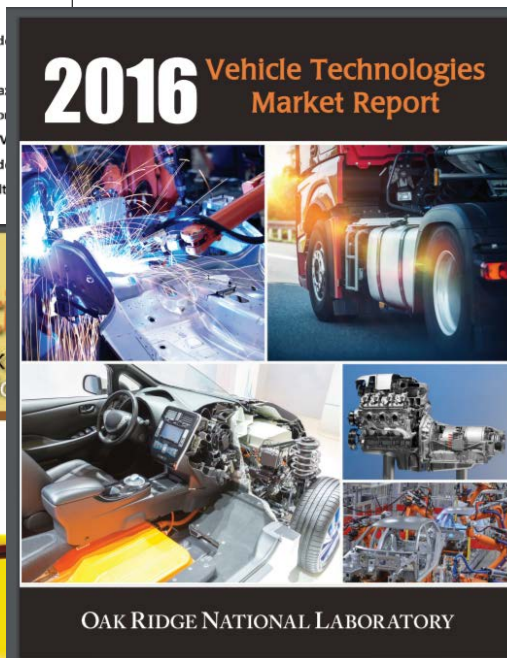
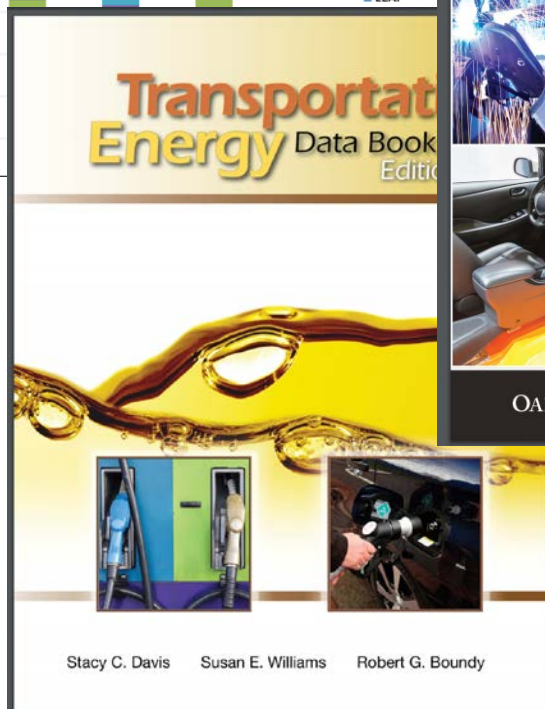
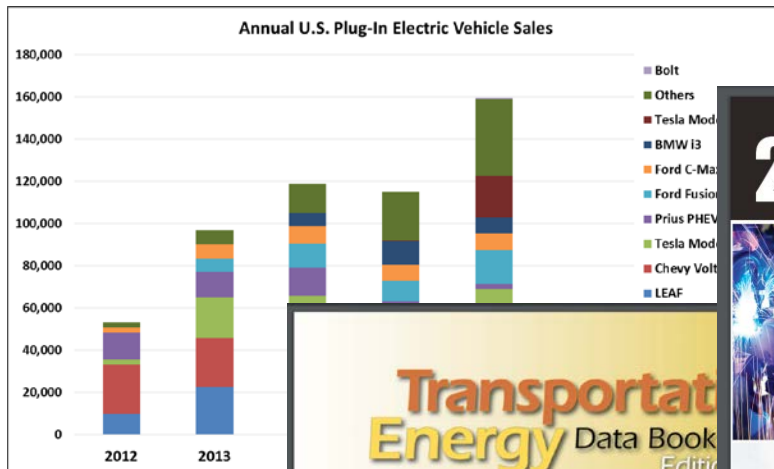


# Analysis Projects Leveraged Across Partnerships





## Provides insight into transportation and energy use for broad range of stakeholders



# Portfolio is ever-evolving with the rapidly changing transportation environment



U.S. DEPARTMENT OF ENERGY

## SMARTMOBILITY

Systems and Modeling for Accelerated Research in Transportation



### Consumer Views on Plug-in Electric Vehicles – National Benchmark Report

Mark Singer  
National Renewable Energy Laboratory

NREL is a national laboratory of the U.S. Department of Energy Office of Energy Efficiency & Renewable Energy Operated by the Alliance for Sustainable Energy, LLC  
This report is available at no cost from the National Renewable Energy Laboratory (NREL) at [www.nrel.gov/publications](http://www.nrel.gov/publications).

Technical Report  
NREL/TP-5400-65279  
January 2016

Contract No. DE-AC36-08GO28308



### Estimated Bounds and Import Factors for Fuel Use and Consumer Costs of Connected and Automated Vehicles

T.S. Stephens  
Argonne National Laboratory  
J. Gonder and Y. Chen  
National Renewable Energy Laboratory  
Z. Lin and C. Liu  
Oak Ridge National Laboratory  
D. Gohlke  
U.S. Department of Energy

NREL is a national laboratory of the U.S. Department of Energy Office of Energy Efficiency & Renewable Energy Operated by the Alliance for Sustainable Energy, LLC  
This report is available at no cost from the National Renewable Energy Laboratory (NREL) at [www.nrel.gov/publications](http://www.nrel.gov/publications).

Technical Report  
NREL/TP-5400-67216  
November 2016

Contract No. DE-AC36-08GO28308

### Modeling plug-in electric vehicle charging demand with BEAM

The framework for behavior energy autonomy mobility

Authors:  
Colin Sheppard, Rashid Waraich, Andrew Campbell, Alexei Pozdnukhov, Anand R. Gopal

Energy Analysis and Environmental Impacts Division  
Lawrence Berkeley National Laboratory

Sustainable Transportation Initiative

May 2017



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## Adapting current models and tools to accurately estimate transportation energy use

**GM** | CORPORATE NEWSROOM

Home News Company Plants & Facilities

**DAIMLER**

AUTONOMOUS DRIVING

Driving autonomous Freightliner In

The Local Motors Olli is a driverless EV minibus with a steering wheel inside

**USA TODAY**

NEWS SPORTS

**THE WALL STREET JOURNAL**

Home World U.S. Politics Economy Business Tech Markets Opinion Arts Life Real Estate

**Google, Fiat Chrysler Begin Work on Self-Driving Minivans**

Alphabet Inc. unit also will establish self-driving engineering center in Detroit area

**Driving Volvos**

**FORD**

A PEOPLE COLLECTIONS CAMPUS

SEARCH

AUG 16, 2016 | PALO ALTO, CALIF.

**FORD TARGETS FULLY AUTONOMOUS VEHICLE FOR RIDE SHARING IN 2021; INVESTS IN NEW TECH COMPANIES, DOUBLES SILICON VALLEY TEAM**

Ford announces intention to deliver high-volume, fully autonomous vehicle for ride

**ENERGY** | Energy Efficiency & Renewable Energy

# Lessons Learned and Impacts of Analysis Projects

## FY17 Funding Supported over 50 Publications

FY 17 Select Impacts (not comprehensive)	Presentation/Poster
Transportation Energy Data Book; VTO Market Report; EV Sales Tracking; Consumer Preference on EVs and CAVs	VAN016 (poster)
Household travel modeling; GREET lifecycle water consumption additions; Mode shift freight energy analysis	VAN017 (poster)
VTO Benefits Analysis: Energy impacts of VTO targets	VAN018 (poster)
Away-from-home EV charging assessment impact on EV sales; Vehicle choice modeling sensitivity analysis	VAN019 (oral)
Foundational energy implications of CAVs; Develop common assumptions to model and compare CAVs impacts	VAN020 (oral)
Modeling updates to vehicle choice model MA3T Adding mobility choices and connected and automated vehicles	VAN021 (oral)
Model CAVs over drivetrain cycles; CAVs traffic flow modeling	VAN022 (oral)
Simulate vehicles with VTO target success; Publish vehicle resizing results	VAN023 (poster)
Published cost and specification information on DC Fast Charging sites for EVs [sponsored by Clean Cities]	VAN024 (oral)
Provided information to Smart Columbus on infrastructure siting	VAN025 (oral)

Analysis Sessions are on Thursday afternoon and evening



## Conclusion

- What R&D to invest in to:
  - improve efficiency,
  - save consumers money,
  - create economic growth,
  - and protect human health
- What will the future look like if we meet all our subprogram targets and how do we invest in those today to achieve that future?

